Generative Adversarial Networks–Enabled Human–Artificial Intelligence Collaborative Applications for Creative and Design Industries: A Systematic Review of Current Approaches and Trends

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Abstract

The future of work and workplace is very much in flux. A vast amount has been written about artificial intelligence (AI) and its impact on work, with much of it focused on automation and its impact in terms of potential job losses. This review will address one area where AI is being added to creative and design practitioners' toolbox to enhance their creativity, productivity, and design horizons. A designer's primary purpose is to create, or generate, the most optimal artifact or prototype, given a set of constraints. We have seen AI encroaching into this space with the advent of generative networks and generative adversarial networks (GANs) in particular. This area has become one of the most active research fields in machine learning over the past number of years, and a number of these techniques, particularly those around plausible image generation, have garnered considerable media attention. We will look beyond automatic techniques and solutions and see how GANs are being incorporated into user pipelines for design practitioners. A systematic review of publications indexed on ScienceDirect, SpringerLink, Web of Science, Scopus, IEEExplore, and ACM DigitalLibrary was conducted from 2015 to 2020. Results are reported according to PRISMA statement. From 317 search results, 34 studies (including two snowball sampled) are reviewed, highlighting key trends in this area. The studies' limitations are presented, particularly a lack of user studies and the prevalence of toy-examples or implementations that are unlikely to scale. Areas for future study are also identified.